

ABSTRACT

A transducer that reduces noise, increases sensitivity, and improves the time response of a linear variable differential transformer (LVDT). The device replaces the primary coil and the high permeability ferromagnetic core of conventional LVDTs with a primary wound around a moving non-ferromagnetic core. In addition to reducing or eliminating Barkhausen noise, this approach reduced or eliminated a number of other undesirable effects in conventional LVDTs including excessive eddy current heating in the core, non-linearities associated with high permeability materials and the length scale of the flux circuit. These improvements are coupled with improved LVDT signal conditioning circuitry. The device is also an actuator and may be used to convert differential voltages into force. Devices with these improvements have numerous applications, including molecular force measurements, atomic force microscopy and manipulation technology, lithographic manufacturing, nanometer scale surface profiling and other aspects of nanotechnology.